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**Original article**

# Socioeconomic inequalities in quality of life and psychological outcomes among cardiac patients

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**Abstract**

**Objectives:** The aim of this article is to explore socioeconomic inequalities in the psychological characteristics (psychological well-being, perceived mental health status) and perceived quality of life among cardiac patients.

**Methods:** A structured interview was conducted with 362 patients (32 % women, mean age 56 ± 7.3 years) referred for coronary angiography. The GHQ-28 was used to measure psychological well-being, the SF-36 for perceived mental health status. Income and education indicated socioeconomic position. Logistic regressions were employed, adjusted for age, gender, functional status and severity of disease.

**Results:** Patients with low income or education had a higher probability of having poor psychological well-being compared to participants with high income or education (OR 5.5,CI 2.32-12.80; OR 3.1,CI 1.52-6.37 resp.), and were also more likely to have worse mental health status (OR2.9,CI 1.02-8.51;OR 4.8,CI 1.36-16.99 resp.), and low quality of life (OR 2.9,CI 1.02-8.51; OR 4.8,CI 1.36-16.99 resp.).

**Conclusions:** Socioeconomic status was found to be negatively associated with the psychological outcomes and quality of life among cardiac patients. Socioeconomic inequalities should be taken into account when designing suitably-adapted interventions focusing on psychosocial factors among cardiac patients.

**Keywords:** Coronary heart disease – Psychological well-being – Quality of life – Socioeconomic inequalities – Education – Income.

## Introduction

Although the mortality caused by coronary heart disease in the most European countries decreased in the recent years, still CHD is the leading cause of morbidity and disability of the population- it is predicted that by the year 2020 coronary heart disease (CHD) will overtake infectious disease as the world's leading cause of death and disability, and depression will take third place in leading causes of burden of disease[1,2]. Research directions in the field of coronary heart disease have changed considerably over the last few decades. Besides the traditional biomedical factors, more attention is being focused on the role of psychosocial factors and socioeconomic position in the etiology and prognosis of CHD. Both psychosocial and socioeconomic factors have been shown to have significant influence on the quality of life, not only among the general population but also among people who already suffer from cardiovascular disease[3,4].

In the last decade one of the most important observations in the field of public health is that relative socioeconomic disadvantage in society constitutes an independent health risk. When morbidity and mortality data are connected with the traditional risk factors, then relative social disadvantage has a far greater effect than the other factors[5]. As Marmot & Elliot[6] conclude, socioeconomic differences in CHD have increased throughout Europe in the last few decades. The trends in mortality from CHD have been uneven in the European countries. Heart disease has declined in frequency in the west, but increased in the east, opening up an east-west gap. Also within the particular countries the decline in CHD rates has

been steeper in subgroups of the population in more favoured socioeconomic positions. In a considerable number of studies it has been shown that socioeconomic disadvantage during the course of life (poor income, low education) is associated with higher presence of CHD life-style risk factors (heavier smoking, worse nutrition, higher levels of cholesterol) and with worse prognosis among patients[7–10]. Higher CHD mortality and morbidity risk has been found in patients from low socioeconomic groups[11–14]. Social inequalities might have significant impact also on later prognosis among patients suffering from coronary heart disease, by influencing factors of the disease management, such as access to health care, optimal self-management and adherence to the medical advices, and access to and willingness to participate in the rehabilitation programs.

The relationship between psychosocial factors and cardiovascular disease has also been well established, mostly using behavioural and psycho-physiological conceptual pathways[15]. Poor mental health (depression, anxiety) has been shown to be associated with higher incidence of life-style risk factors (smoking, lack of physical activity) and negative physiological changes (e. g. sympatho-adrenal hyperactivity, neuroendocrine regulation disbalance, affecting blood lipids and blood pressure), which increase cardiac risk[16–18]. Depressive symptoms not only increase the likelihood of CHD, but also have adverse effects on later prognosis[19,20]. The presence of depression after myocardial infarction (MI) is associated with increased mortality and morbidity risk, meaning that patients with high levels of post-MI depression are more likely to die of cardiac causes, and have higher probability of cardiac complications[21–23].

Although significant progress has been made in research on the influence of social position and mental health on cardiovascular disease, there is much we still do not know about the relationship between these factors with respect to the general quality of life among patients who suffer from coronary heart disease. No evidence is available about the nature of associations between socioeconomic status and the psychological outcomes (psychological well-being, anxiety, depression, perceived mental health status), and quality of life among patients with coronary heart disease. It is probable that if such differences occur, socioeconomic disadvantage may have a negative effect not only on general quality of life among CHD patients, but also on later prognosis of their disease.

The aim of this article is to explore socioeconomic inequalities in the psychological outcomes (psychological well-being, perceived mental health status), and perceived overall quality of life among patients with coronary heart disease. Quality of life, according to the World Health Organization (WHO) definition, is a multidimensional construct with numerous physical, psychological, social and economic components which predict good or bad quality of life[24]. Despite the uncertainty in definitions, health-related quality of life or perceived health status (the self-evaluated mental status of patients as a reflection of their disease) is a construct of high clinical relevance, as recent research has shown that it is an important predictor of other health outcomes among patients with chronic disease[4,25,26]. The study by Lenzen et al[27] showed that impaired health status is associated with a 2 to 3-fold increased risk of all-cause mortality in patients with CHD, independent of other conventional risk factors. Psychological well-being (individual mood often operationalized by anxiety and depression) is considered as another important psychological aspect of quality of life, also significantly connected with the health outcomes among patients with CHD, and specifically with the risk and prognosis of CHD[28,29]. The importance of paying attention to the socio-economic differences in quality of life among patients with coronary heart disease is not only due to equity concerns, but also to efficiency concerns with respect to policy implications for new treatments or interventions.

## Methods

The group of participants consisted of 362 patients referred by their cardiologists to the East Slovakian Institute for Cardiac and Vascular Diseases in Kosice. Patients from the whole East Slovakian region with cardiovascular disease are referred to this medical centre for diagnosis and treatment. Patients were invited to participate in this research during their hospitalization for coronary angiography. All participants were provided with information about the study and signed an informed consent statement. Ethical approval was obtained from the medical ethical committee of the East Slovakian Institute for Cardiac and Vascular Diseases. Response rate was 93.9 %. There were no significant differences between responders and non-responders either in age or gender. Participants included in the study were those meeting the following criteria: coronary heart disease in the anamnesis, age less than 75, without severe cognitive impairments, and no history of severe psychiatric disorders in the anamnesis. Patients with cardiovascular problems other than CHD (e. g. valve disease) and with serious comorbidity were excluded. A structured interview was conducted with each patient by a trained interviewer, with questions concerning medical history, socioeconomic position (education, income), and functional status. Patients also completed self-reported questionnaires. Data collection was carried out from October 2004 till November 2006.

To assess psychological well being, the GHQ 28 – General Health Questionnaire was used[30]. The GHQ 28 is designed to

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| Variable | | N | % or mean | SD | range |
|---|---|---|---|---|---|
| Gender | Male | 245 | 67.7 % | | |
| | Female | 117 | 32.3 % | | |
| Age | | 362 | 55.9 | 7.3 | 27–75 |
| Education | Low | 118 | 32.6 % | | |
| | Middle | 191 | 52.8 % | | |
| | High | 53 | 14.6 % | | |
| Income | Low | 50 | 14.7 % | | |
| | Middle | 218 | 64.1 % | | |
| | High | 72 | 21.2 % | | |
| Psychological well-being | | 312 | 26.9 | 11.3 | 8–66 |
| Anxiety | | 321 | 6.9 | 4.5 | 0–21 |
| Depression | | 321 | 2.4 | 2.9 | 0–13 |
| Mental health status | | 319 | 58.5 | 15.9 | 11–100 |

**Table 1.** Descriptive statistics for the study variables.

| | Mean scores | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Income | | | | Education | | | |
| | low | middle | high | p | basic | middle | high | p |
| Well-being | 33.00 | 26.50 | 24.18 | **0.001** | 29.34 | 26.53 | 23.63 | **0.010** |
| Anxiety | 8.74 | 6.68 | 6.23 | **0.001** | 7.66 | 6.88 | 5.62 | **0.050** |
| Depression | 4.10 | 2.33 | 1.68 | **0.001** | 3.27 | 2.09 | 2.04 | **0.010** |
| Mental health | 50.73 | 58.31 | 63.90 | **0.001** | 55.86 | 58.13 | 64.41 | **0.010** |

**Table 2.** Mean scores for psychological well-being, depression, anxiety, and perceived mental health status in different income and educational groups. The higher the GHQ 28 score, the lower the psychological well-being, and the higher the anxiety and depression. The higher the mental component of SF36, the better the perceived health status.

measure mental health status, and consists of 28 items divided into 4 subscales: physical symptoms, anxiety and insomnia, impairment of social functioning, and depression. The score for each subscale ranges from 0 to 21, so the total GHQ 28 score is between 0 and 84, with higher scores indicating worse mental health status. Patients are asked to compare their recent psychological state with their usual state. Scores can be interpreted as indicating the severity of psychological disturbance. The cut-off point identifying a probable risk case is 5 positive answers[31]. A validation study of the GHQ 28 among people with chronic diseases has reported acceptable data on the internal consistency and validity of the scale[30]. The psychometric properties of the Slovak version of the GHQ 28 are discussed in a study by Nagyova et al.[29]. In the present study the Cronbach alpha was 0.916.

The mental component of the SF-36 questionnaire was used to measure perceived mental health status[32]. The SF-36 questionnaire provides a subjective measure of health status across eight scales. Four of them (vitality, emotional role limitations, mental health and social functioning) can be summarized into a mental functioning component summary indicating the perceived mental health status. The summary score ranges from 0 to 100, with lower scores indicating worse perceived health status. We used a cut-off score of 42, as this cut-off point had a sensitivity of 74 % and a specificity of 81 % in detecting patients with depressive disorder[32]. A validation study of the SF-36 among cardiac patients showed good psychometric properties of the scale[25]. In the present study the Cronbach alpha was 0.73.

Each patient's perception of overall quality of life was assessed using Cantrill's ladder[33] ranging from 0 (at the bottom, indicating worst quality of life imaginable) to 10 (at the top, indicating the highest quality of life imaginable). Andrews[34] reported acceptable data on the reliability and validity of this scale. We used cut-off point of 5 points or lower as indicating the poor quality of life.

Income level and education were used as the indicators of socioeconomic status. Participants' income was divided into three levels: 1) low income: income equal to and lower than the 'minimum wage', 2) middle income: higher than the 'minimum wage' but lower than twice the 'minimum wage', 3) high income: twice the 'minimum wage' and higher. The 'minimum wage' is a standardized indicator of the financial situation which is frequently used in Slovakia. People with an income lower than the minimum wage are considered to live below the 'poverty level' and can claim welfare support. This

| Outcome variable | | Crude effect[1] OR (95 % CI) | Adjusted effect[2] OR (95 % CI) | Effect adjusted for functional status[3] OR (95 % CI) |
|---|---|---|---|---|
| **Psychological well-being** | Income | | | |
| | high | 1.00 | 1.00 | 1.00 |
| | middle | **2.18** (1.22–3.89) | **1.86** (1.10–3.4) | 0.99 (0.45–2.21) |
| | low | **5.46** (2.32–12.80) | **4.23** (1.67–10.48) | **7.26** (1.85–28.41) |
| | Education | | | |
| | high | 1.00 | 1.00 | 1.00 |
| | middle | 1.98 (1.00–3.80) | 1.63 (0.80–3.29) | 1.40 (0.54–3.57) |
| | low | **3.11** (1.52–6.37) | 1.89 (0.84–4.27) | **3.15** (1.07–9.04) |
| **Perceived mental health status** | Income | | | |
| | high | 1.00 | 1.00 | 1.00 |
| | middle | 2.04 (0.86–4.84) | 1.53 (0.61–3.84) | 1.70 (0.60–4.83) |
| | low | **2.95** (1.10–8.52) | 1.82 (0.56–5.88) | 2.23 (0.64–7.80) |
| | Education | | | |
| | high | 1.00 | 1.00 | 1.00 |
| | middle | 3.34 (0.97–11.46) | 2.82 (0.80–9.89) | 2.66 (0.55–12.78) |
| | low | **4.80** (1.36–16.99) | **3.84** (1.10–14.68) | **5.13** (1.36–25.52) |

**Table 3.** Logistic regression analyses – risk of having poor psychological well-being and poor perceived mental health status in different socioeconomic groups. Significant effects are in bold ($p < 0.05$).

[1] Model was adjusted for the effect of age and gender.
[2] Model was adjusted for the effect of age, gender and education/or/income.
[3] Model was adjusted for the effect of age, gender and education/or/income, and functional status.
Poor psychological well-being = higher than the cut-off score for GHQ 28 (5 positive answers)
Poor perceived health status = lower than the cut-off score for the mental subscale of SF 36 (of 42 points)

indicator also takes into account the household income. Participants educational level was assessed by the type of school completed, divided into basic (elementary school), middle (high school with or without graduation exams) and higher (university diploma ) education.

Functional status was assessed by a cardiologist as a combination of two factors: NYHA – four classes according to the New York Heart Association classification of dyspnoea symptoms[35] and CCS – four classes identifying the severity of chest pain according to criteria of the Canadian Cardiovascular Society[36].

As the first step, analysis of variance was used, after the performance of Chi-square tests of normality. In the further steps we examined the relative effects of low and middle income and education on the occurrence of low psychological well-being, poor perceived mental health status and low perceived overall quality of life, using logistic regression. First, the crude effects of income and education on psychological well-being, mental health status and quality of life were computed. Next, the effect of income was adjusted for education and vice versa, and afterwards the effect of income and education on all psychological factors was adjusted for functional status. Analyses were not stratified by gender in order to obtain a larger sample size for analysis after testing the role of gender as effect modifier.

All models were adjusted for age and gender. Analyses were performed using SPPS 10.1 and 14. 1. for Windows.

## Results

The demographic characteristics of the participants are presented in Table 1. The mean age was 55.9 years, with standard deviation 7.3, range 27-75 years. Thirty percent of the participants were women. Low income was reported by 14.7 %, middle income by 64.1 % and a high income by the 21.2 % of the participants. The educational level was low in 32.6 % of the participants, middle in 52.8 %, and 14.6 % of patients had higher education.

The proportion of patients with poor perceived mental health status was 67.3, 32.2 % patients had poor perceived quality of life, and the proportion of patients with poor psychological well-being was 49.7.

The mean scores in all subscales of GHQ-28 (psychological well-being, anxiety, depression) and in perceived mental health status among patients in all income and educational groups are presented in Table 2.

Low income was associated with greater probability of having low psychological well-being (OR = 5.5, 95 % CI 2.32-12.80) compared to the group of patients with high income. Participants with middle level of income also had higher probability of having low psychological well- being compared to the high income group (OR = 2.2, 95 % CI 1.22-3.89). These associations remained significant also after controlling for the effect of education, and after adjustment for functional status (see Table 3, adjusted effects).

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| Outcome variable | | Crude effect[1] OR (95 % CI) | Adjusted effect[2] OR (95 % CI) | Effect adjusted for functional status[3] OR (95 % CI) |
|---|---|---|---|---|
| **Perceived quality of life** | Income | | | |
| | high | 1.00 | 1.00 | 1.00 |
| | middle | **2.47** (1.43–4.26) | **1.94** (1.08–3.47) | **2.78** (1.23–6.29) |
| | low | **8.01** (3.10–21.16) | **5.17** (1.83–14.62) | **7.12** (2.04–24.86) |
| | Education | | | |
| | high | 1.00 | 1.00 | 1.00 |
| | middle | **2.16** (1.16–4.03) | 1.77 (0.92–5.62) | **4.95** (1.87–13.12) |
| | low | **4.01** (1.98–8.12) | **2.53** (1.14–5.62) | **5.59** (1.93–16.18) |

**Table 4.** Logistic regression analyses – risk of having low perceived quality of life in different socioeconomic groups. Significant effects are in bold ($p < 0.05$).

[1] Model was adjusted for the effect of age and gender.
[2] Model was adjusted for the effect of age, gender and education/or/income.
[3] Model was adjusted for the effect of age, gender and education/or/income, and functional status
Perceived low quality of life = lower than the cut-off score of 5 points

Patients with basic education were more likely to have poor psychological well-being (OR = 3.1, 95 % CI 1.52-6.37) compared to the participants with higher education. This relationship remained significant after adjustment for functional status, but the significance disappeared after controlling for the effect of income. Middle-level education was not associated with greater likelihood of having low psychological well-being compared to the higher education group (see Table 3, adjusted effects).

Low income was associated with greater probability of having poor perceived mental health status (OR = 2.95, 95 % CI 1.10-8.52), compared to the group of patients with high income. This association did not remain significant after controlling for the effect of education, and after controlling for functional status. Middle income was not associated with greater likelihood of having poor perceived mental health status compared to the high income group. (see Table 3, adjusted effects).

Patients with basic education were more likely to have poor perceived mental health status (OR = 4.8, 95 % CI 1.36-16.99), compared to the participants with higher education. After controlling for the effect of income, and functional status, the odds ratios remained significant. Middle-level education was not associated with greater likelihood of having poor perceived mental health status compared to the higher education group (Table 3, adjusted effects).

Low income was associated with greater probability of having low perceived quality of life (OR = 8.01, 95 % CI 3.10-21.16), compared to the group of patients with high income. Participants with middle income also had higher probability of having low perceived quality compared to the high income group (OR = 2.47, 95 % CI 1.43-4.26). This relationship remained significant after controlling for the effect of education, and after controlling for functional status (Tab. 4, adjusted effects).

Patients with basic education were more likely to have low perceived quality of life (OR = 4.01, 95 % CI 1.98-8.12), compared to the participants with higher education. Middle-level education was also associated with greater likelihood of having low perceived quality of life compared to the higher education group (OR = 2.16, 95 % CI 1.16-4.03). After controlling for the effect of income, and functional status, the odds ratios remained significant. (Tab. 4, adjusted effects).

## Discussion

The results of our study show significant socioeconomic differences in psychological well-being, perceived mental health status and perceived quality of life among patients with CHD. When comparing different income and education groups, we found that especially patients with income under the minimum wage, and participants with low education are at risk of having poor psychological well-being and mental health status. Very low income and the consequent financial stress might be particularly important factors negatively influencing psychological well-being and mental health[37,38]. An insufficient level of income and the resulting financial strain are not only associated with the general standard of living, but could also be seen as one dimension of social exclusion – lack of money prevents individuals from participating fully in society[39]. Moreover, among patients with a chronic disease, all factors (medical, dietary or psychosocial) are strongly influenced by social conditions such as education or income levels[3, 10].

Based on the results of analysis of variance and regression models, income seemed to be a 'more significant' predictor of poor mental health status, psychological well-being and perceived quality of life than education in our study (the education ceases to be significant in the logistic model after adjustment for income). However, it is necessary to take into ac-

count possible mediated effects between these two indicators of socioeconomic position. Education is the most commonly used indicator of socioeconomic status in studies focusing on social inequalities in health[40–42]. This is partly due to the fact that educational grade is (to some extent) a predictor of income, which in turn might be associated with mental health outcomes and quality of life[43,44]. In this case, education might be a similar or even more important determinant of the income-mental health relationship in our study as well. Another possible explanation for inconsistency in the results regarding education/income may be the different distribution of income and educational levels among our patients. Every participant in our study had completed the compulsory basic education, but not all of our patients earned at least the minimum wage level of income – there was a group of patients with income lower than the minimum wage.

It should be also taken into account, that education might be a more useful predictor when studying pathway mechanisms of health behavior, while income is probably more influencing factors such as living conditions and access to health care. With this perspective, we could hypothesize that psychological well-being is also more influenced by current social conditions underlying standard of everyday living and the problems which has to be faced when financial strain is present.

However, the basic trend was the same in both indicators of socioeconomic status; both low income and low education were associated with worse psychological well-being, and poor perceived mental health status and perceived quality of life. The question arises as to what linking mechanism exists between socioeconomic status, coronary heart disease and mental health? Some studies suggest that the impact of low socioeconomic status may be linked to increased risk of coronary heart disease via a psychosocial mechanism – depression and anxiety are more prevalent in lower socioeconomic groups and may later produce acute or chronic physiological changes increasing the risk of coronary heart disease[10,15,45,46]. But other possibilities are also worth considering. For instance, stress might play some role in these relationships. Stress is not only a predictor of both coronary heart disease and depression; it is also related to social position. Chronic stress is often proposed as an integrating theory that can result in adverse health outcomes through biological, psychosocial and behavioural pathways. Uncontrollable stress is experienced particularly by individuals who have failed to develop a broad spectrum of behavioural strategies for controlling psychosocial conflicts. This might be part of the explanation, given that depressive symptoms show a strong socioeconomic gradient, especially in the rapidly-changing societies in Central and Eastern Europe in the last two decades[5].

Clearly, there is a complexity of association between socioeconomic status, coronary heart disease and mental health, which was hard to capture in our study due to some limitations, which need mentioning. The analyses are based on cross-sectional data, so they do not provide the possibility of causal interpretations of associations between the variables. Further research with a longitudinal design would be useful in order to explore also the causal associations between socioeconomic status, mental health and coronary heart disease. However, the significant socioeconomic differences which were found in psychological well-being, perceived mental health status and perceived quality of life in our study support the hypothesis about the negative impact of lower socioeconomic status on the general quality of life among patients with coronary heart disease, and imply a possible adverse effect on prognosis of the disease.

Both psychological well-being and perceived mental health status have been shown to be associated with worse prognosis and lower quality of life among patients with coronary heart disease. It might be doubtful whether the treatment of these factors could improve cardiovascular prognosis in patients, but it has been shown that such interventions significantly improve patients' quality of life[47–48].

The concept of social inequalities was originally introduced into the public health agenda to highlight the importance of nonclinical factors in shaping the health of individuals and societies. Thus, the problem of health inequalities arising from access to care and assistance should be taken into account by clinicians as well. And besides that, it could be underlined that in psychological treatment and rehabilitation of cardiac patients targeted attention should be given to some patients that are particularly vulnerable to have worse psychological well-being and quality of life due to their socioeconomic disadvantage.

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